

CLAIMS

What is claimed is:

- 1 1. A single photon read-out circuit comprising:
 - 2 a feed-back enhanced reset amplifier;
 - 3 a photodetector connected to an output of the reset amplifier; and
 - 4 a high-gain amplifier connected to the photodetector.
- 1 2. The circuit of Claim 1, wherein the high-gain amplifier comprises:
 - 2 an adaptive skimming circuit having an integration capacitor..
- 1 3. The circuit of Claim 2, further comprising a source follower transistor
 - 2 connected to the output of the input transistor.
- 1 4. The circuit of Claim 3, further comprising an access transistor connected
 - 2 between the input transistor and a bus.
- 1 5. The circuit of Claim 4, wherein the reset amplifier comprises a CMOS
 - 2 inverter.
- 1 6. The circuit of Claim 5, further comprising a reset transistor.
- 1 7. The circuit of Claim 6, further comprising a sample-and-hold transistor and
 - 2 a sample-and-hold capacitor.
- 1 8. The circuit of Claim 5, wherein the reset amplifier further comprises an
 - 2 autozero transistor, a first capacitor, and a second capacitor.
- 1 9. The circuit of Claim 5, wherein the reset amplifier further comprises a
 - 2 current source shared by all pixels on a bus.
- 1 10. A focal plane array (FPA) having a plurality of pixel cells, each pixel cell
 - 2 comprising:
 - 3 a feed-back enhanced reset amplifier;
 - 4 a photodetector connected to an output of the reset amplifier; and
 - 5 a high-gain amplifier connected to the photodetector, the high-gain
 - 6 amplifier comprising:

7 an input transistor;
8 a current source transistor connected to the input transistor;
9 a reset transistor connected to the current source transistor; and
10 an adaptive skimming circuit having an integration capacitor;
11 wherein the reset amplifier reduces kTC noise, and the high-gain
12 amplifier nulls current associated with the photodetector to reduce signal non-
13 uniformity.

1 11. An amplifier circuit for single photon read-out of photodetectors in an
2 imaging array, the circuit comprising:
3 detector means for converting incident light to an input electric signal;
4 reset amplifier means connected to the detector means for suppressing
5 kTC noise, and
6 a high-gain amplifier means connected to the detector means for
7 reducing signal non-uniformity.

1 12. A single photon read-out circuit comprising:
2 a detector;
3 a reset transistor having a drain connected to the detector;
4 an inverter amplifier connected between the drain of the reset transistor
5 and a source of the reset transistor;
6 an input transistor having a source connected to the detector;
7 a current source transistor having a drain connected to a drain of the
8 input transistor; and
9 an adaptive skimming circuit connected to the current source transistor,
10 the adaptive skimming circuit comprising an integration capacitor.

1 13. The circuit of Claim 12, further comprising a source follower transistor
2 having a source connected to the drain of the input transistor.

1 14. The circuit of Claim 12, further comprising a first capacitor connected
2 between the drain of the reset transistor and the photodetector, and a second capacitor
3 connected between the source of the reset transistor and photodetector.

1 15. The circuit of Claim 14, further comprising a current source, shared by all
2 pixels on a bus, connected to the reset transistor and the inverter amplifier.

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